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TEMPERATURE CONTROLLED FROZEN FOOD DISPENSER

Field of the Invention

This invention relates generally to dispensing; more particularly to dispensing food items; and more particularly still to a temperature controlled dispensing unit for dispensing frozen food items.

Background of the Invention

Frozen french fry dispensers are known in the art. An example is disclosed in U.S. Patent No. 5,282,498 issued to Cahlander et al; U.S. Patent No. 5,353,847 issued to Cahlander et al; and U.S. Patent No. 5,191,918 issued to Cahlander et al. Each of the foregoing patents discloses a french fry dispenser that includes a main storage bin, a device for moving the fries from the main storage bin into a secondary location, a structure for holding the fries in the secondary location, and a complex apparatus for moving empty cooking baskets into position under the secondary storage location.

While the disclosed food dispenser in the Cahlander patents automates the process of dispensing frozen articles and has been successful in the marketplace, there are several areas in which the food dispenser may be improved. First, the complex apparatus used for automatically moving the plurality of baskets into position under the secondary position is often not needed and/or desired by the end-user. Further, in such instances, providing such a device introduces unnecessarily complex and expensive equipment into the dispenser.

Second, the manner in which the disclosed apparatus determines the weight of the articles to dispense does not provide highly accurate results (e.g., dispensing by time and by volume may be non-linear based in part upon the articles dispensed). To solve the problem, a load cell is often used to accurately measure the weight of the articles. However, such a load cell can be an expensive piece of

equipment that adds more expense into the food dispenser apparatus. Furthermore, there is no accurate way of determining the amount of product left in the main storage bin. Accordingly, there is a need for an inexpensive and accurate load/weight measuring device.

Third, the device for moving the fries from the main storage bin into the secondary location can become clogged by large clumps of fries, thus causing breakage of the fries. Further, in some instances, articles that have different characteristics from fries are desired to be dispensed. Accordingly, a controllable device is needed to resolve this problem.

Fourth, the manner in which the disclosed apparatus dispenses does not have an efficient dispensing rate for various types of food products or articles. More specifically, the dispensing rate is either too fast, which causes difficulty in stopping at an accurate weight, or too slow, which extends to an unreasonable time for many applications, such as the fast food industry. A fundamental problem when rapidly dispensing a dense product or product with a large weight per particle is that the product cannot be stopped at an accurate weight, for example, due to the weight of product in flight (i.e., the weight of the product that has not reached the weighing mechanism but that has been dispensed). Thus, there is a need to dispense the product at an appropriate rate, e.g. at a rate which reacts to the approaching target weight. Another associated problem is that if the load/weight sensing/measuring assembly operates at a rate appropriate to a denser product, a weighing cycle may be extended to an unreasonable time (e.g., four to six times the cycle for a heavier product). Thus, there is a need for a controllable weighing mechanism to provide an appropriate dispensing rate based on the weight of articles dispensed.

Fifth, it is often desired to limit the defrosting/thawing of the frozen articles or to maintain the frozen articles at a predetermined temperature. In many cases, however, the frozen articles to be dispensed from the disclosed apparatus are easily defrosted or thawed, especially when the dispenser is near the cooking area. Accordingly, there is a need for an air restricting mechanism implemented in the

apparatus to help slow the defrosting/thawing of the frozen articles. Furthermore, there is a need for an apparatus that controls the temperature of the frozen articles.

Sixth, the disclosed Cahlander apparatus is adapted for dispensing frozen fries. The disclosed apparatus is not configured and arranged to dispense other articles, such as onion rings, different sized frozen fries, or protein products such as chicken tenders, drummies, etc. Therefore, there is a need for an improved dispenser apparatus that is configured and arranged to dispense a variety of food products or articles.

Summary of the Invention

The invention generally relates to a food dispensing apparatus and method that maintains food articles within a predetermined temperature range prior to dispensing of the food articles. One aspect of the invention relates to an apparatus for dispensing food articles to a food article receiving container that includes a hopper that defines a primary food article storage location configured to hold the food articles, and an accumulator that defines an secondary food article storage location (which may be referred to throughout the specification and claims as an "accumulator food article storage location") and is positioned adjacent to the primary food article storage location so as to receive food articles held in the primary storage location. The food article receiving container is positioned generally beneath the accumulator so that food articles moving from the accumulator food article storage location land in the food article receiving container. The apparatus also includes a cooling device configured to maintain a predetermined temperature range in the primary food article storage location and the accumulator food article storage location. In another embodiment, the apparatus may include a load/weight sensing/measuring assembly in place of or in addition to the cooling device. The load/weight sensing/measuring assembly is configured to weigh the food articles located in the primary food article location and generate a weighed signal.

Another aspect of the invention relates to a method of dispensing food articles from a food storage device to a food article receiving container. The device includes a primary food article storage location, an accumulator food article storage

location having an accumulator door, a weighing device, and a cooling device. The method may include the steps of loading the articles into the primary food article storage location, weighing the food articles in the primary food article storage location, moving food articles from the primary food article storage location to the accumulator food article storage location, determining the weight of the moved food articles by calculating a difference between the weight of the food articles in the primary food article storage location before and after the food articles are moved into the accumulator food article storage location, and opening the accumulator door to dispense the food articles from the accumulator food article storage location to the food article receiving container.

A yet further aspect of the invention relates to a method of dispensing food articles from a food storage device to a food article receiving container, the device including a primary food article storage location, an accumulator article storage location having an accumulator door, and a cooling device. The steps of the method may include loading the articles into the primary food article storage location, maintaining a predetermined temperature range in the primary food article storage location with the cooling device, moving food articles from the primary food article storage location to the accumulator food article storage location, and opening the accumulator door to dispense the food articles from the accumulator food article storage location to the food article receiving container.

A still further aspect of the invention relates to an apparatus for dispensing food articles to a food article receiving container that includes a hopper configured to hold the food articles, an accumulator positioned adjacent to the hopper, and a cooling device configured to maintain a predetermined temperature range in the hopper and the accumulator. The food articles held in the hopper are moved from the hopper to the accumulator storage location, and from the accumulator storage location to the food article receiving container.

A further aspect of the invention relates to an apparatus for dispensing food articles to a food article receiving container that includes a hopper configured to hold the food articles, an accumulator positioned adjacent to the hopper and configured

to receive food articles from the hopper and move the received food articles to the food article receiving container, and a weighing device configured to determine the weight of food articles held in the hopper and the weight of food articles moved from the hopper to the accumulator.

Another aspect of the invention relates to an apparatus for dispensing food articles to a food article receiving container that includes a cabinet, a hopper and an accumulator. The cabinet includes a plurality of panels that define an internal cavity and includes an accumulator aperture formed in a bottom panel of the cabinet to provide access to air outside the cabinet. The hopper is configured to hold the food articles and is positioned in the cabinet. The accumulator is positioned in the cabinet vertically below the hopper to receive food articles from the hopper and configured to move the received food articles to the food article receiving container. The accumulator is aligned with the accumulator aperture and further configured to provide a substantially air-tight seal between an interior of the freezer cabinet and air outside the freezer cabinet.

These and various other advantages and features which characterize the invention are pointed out with particularity in the claims annexed hereto and forming a part hereof. However, for a better understanding of the invention, its advantages and objectives obtained by its use, reference should be had to the drawings which form a further part hereof and to the accompanying descriptive matter, in which there is illustrated and described a preferred embodiment to the invention.

Brief Description of the Drawings

Referring to the drawings wherein like numerals represent like parts throughout the several views:

Figure 1 is a front perspective view of one example food dispensing apparatus according to principles of the present invention;

Figure 2 is a front perspective view of the food dispensing apparatus shown in Figure 1 with the front and top covers removed;

Figure 3 is an exploded front perspective view of the dispensing apparatus shown in Figure 1;

Figure 4 is a front perspective view of the food dispensing apparatus shown in Figures 2 and 3 with the right side hopper assembly also removed;

Figure 5 is a front perspective view of the food dispensing apparatus shown in Figure 4 with the right side accumulator assembly also removed;

Figure 6 is a front perspective view of the food dispensing apparatus shown in Figure 5 with the cover panel also removed;

Figure 7 is a front perspective view of the food dispensing apparatus shown in Figure 6 with the right side hopper support assembly also removed;

Figure 8 is a front perspective view of the mounting plate assembly shown in Figures 2 and 3 with the right side linear rail, solenoid and fan exploded from the rest of the assembly;

Figure 9 is an exploded front perspective view of the hopper support assembly shown in Figures 2 and 3;

Figure 10 is an exploded rear perspective view of the hopper support assembly shown in Figures 2 and 3;

Figure 11 is an exploded front perspective view of the accumulator assembly shown in Figure 1;

Figure 12 is an exploded rear perspective view of the accumulator assembly shown in Figure 1;

Figure 13 is an exploded top perspective view of the left side hopper assembly shown in Figure 1;

Figure 14 is a side view of the right and left side hopper assemblies shown in Figures 2 and 3; and

Figure 15 is a cross-sectional view of the hopper assemblies shown in Figure 14 taken along cross-sectional indicators 15-15, illustrating the left side accumulator door in an open position and the right side accumulator door in a closed position.

Detailed Description of the Preferred Embodiment

The present invention provides for a method and apparatus for dispensing food articles and controlling the temperature of the food articles held in the apparatus. The invention also provides for a method and apparatus for weighing the food articles held in the apparatus and controlling the amount of food articles dispensed based on the weighed amount of food articles.

The food article receiving container that receives dispensed food articles may include, for example, a basket, tray, a cooking sheet, or other kitchen utensil/container that is suitable for receiving the dispensed food articles. For ease in describing the invention, the food article receiving container will be referred to throughout the specification and some of the claims as a "basket". The hopper defines a "primary food article storage location" which may be referred to throughout the specification and claims as a "hopper food article storage location." The accumulator defines an "secondary food article storage location" which may be referred to throughout the specification and claims as an "accumulator food article storage location."

In the following description of the exemplary embodiment, reference is made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration the specific embodiment in which the invention may be practiced. It is to be understood that other embodiments may be utilized when structural and other changes may be made without departing from the scope of the present invention.

An example food-dispensing unit 10 incorporating principles of the invention is shown in Figure 1. The food dispenser 10 includes a freezer cabinet 12 and a lower frame structure 14. Freezer cabinet 12 includes a top door 16 that is movable from the closed position show in Figure 1 to an open position in which it slides into first and second brackets 18, 19 (see Figure 3). Freezer cabinet 12 also includes a front door 20 and an operator control panel 22, and includes a plurality of panels (not labeled) that together with the top door 16 and front door 20 define a freezer cavity 24 (see Figures 2 and 3). Freezer cavity 24 can be maintained at a predetermined temperature range for

the purpose of maintaining a predetermined temperature range of the food articles stored within freezer cabinet 12.

Lower frame structure 14 includes first and second side basket trays 30, 32, that support at least first and second baskets 34, 36 on each tray 30, 32. The position of a basket on one of trays 30, 32 may be determined by a position sensor 38 (see Figures 1-3; a separate sensor being associated with tray 32, but not shown in any of the Figures) that senses when a basket is in the fill position beneath one of the accumulators. When basket 34 is removed from tray 32, basket 36 may slide into the fill position automatically and sensor 38 detects the basket 36 in the fill position ready for filling with food articles.

Baskets 34, 36 may be filled either manually or automatically with food articles through the use of operator control panel 22. For example, food dispenser 10 may be programmed through a controller (not shown) that is operated by operator control panel 22 to automatically fill a basket with food articles as soon as sensor 38 indicates that the basket is in a loading position.

Lower frame structure may further include a lower front panel 42 that provides access to a refrigeration unit (not shown) and electrical systems (not shown) of food dispenser 10. Panel 42 may include vents or louvers as shown in Figure 1 to permit free flow of air to the refrigeration unit.

Referring now to Figures 2-3, food dispenser 10 further includes a mounting plate assembly 50, first and second hopper support assemblies 70, 72, first and second accumulator assemblies 90, 92, first and second hopper assemblies 120, 122, and a cover panel 140. These assemblies will be discussed below in greater detail with reference to Figures 8-15. Assemblies 50, 70, 72, 90, 92, 120, 122 and panel 140 are positioned within freezer cabinet 12 and are arranged and configured to dispense food articles stored in freezer cabinet 12 through right and left side cabinet openings 26, 28 into baskets (such as baskets 34, 36) that are supported by lower frame structure 14. Each of the first assemblies 70, 90, 120 cooperate with mounting plate assembly 50 to dispense food articles on the right side of food dispenser 10, while second assemblies 72, 92, 122 cooperate with mounting plate 50 to dispense food articles in the left side of

food dispenser 10. Because the assemblies are separated from each other on the right and left sides of food dispenser 10, each set of assemblies may be used to dispense different types of food articles, such as, for example, vegetables like french fries and protein products like chicken tenders.

Food dispenser 10 controls the amount of food articles dispensed using a negative weighing system, as opposed to a positive weighing system common in known food dispensing units. Known positive weighing systems control the amount of food articles dispensed by weighing the accumulator assembly and continuously monitoring the weight of the accumulator assembly as it is filled with food articles from the hopper assembly until a desired weight is attained. This type of weighing system has some drawbacks as discussed above in the background section of this document. Two primary drawbacks of known weighing systems for food dispensers are that first, the amount of food articles remaining in the hopper assembly is undetermined or must be determined using a separate weighing system, and second, there is decreased weighing accuracy due to "in flight" food articles and the need for calibration of the weighing system. The weighing system of the present invention addresses these drawbacks by continuously monitoring the weight of the food articles remaining in the hopper assembly and eliminating the need to account for "in flight" food articles and to calibrate the weighing system.

Another significant drawback of known food dispensing units is that they are not refrigerated and therefore cannot reliably maintain a predetermined temperature (or temperature range) of the stored food articles. Although known food-dispensing units may include insulated cabinets, hoppers, accumulators, and other features, as well as control the flow of room temperature air into the insulated areas where the food articles are stored, known food dispensers cannot prevent the stored food articles from undergoing at least a partial thaw prior to being dispensed to a basket.

The food dispenser of the present invention includes a refrigeration unit that actively cools the cavity in which the hopper and accumulator assemblies are stored. When dealing with frozen food articles, the food dispensing unit of the present invention preferably maintains a target temperature within the freezer cavity of less than

20°F, and more preferably a target temperature between about 0° to 10°F. In other applications that require only refrigeration of the food articles rather than freezing of the food articles, the refrigerated cavity may be maintained at a target temperature of less than 60°F and preferably a temperature range between about 30° to 50°F. A "predetermined temperature range" is broadly defined as including a specified temperature range, such as 0° to 10°F, or may be temperature range controlled to be maintained at a set point temperature, such as 20°F. A set point (or target) temperature may include a range of temperature degrees above and/or below the set point temperature, for example, 20°F ±1°F. Using a temperature range may be preferable in many embodiments in order to improve efficiency of the cooling device, for example, by reducing the number of cycles of the cooling device.

Referring now to Figures 4-7, the positional relationship between various assemblies of food dispensing unit 10 are shown in greater detail. Figure 4 illustrates food dispenser 10 with the first hopper 120 removed. Figure 5 illustrates food dispenser 10 with first accumulator assembly 90 also removed, and further illustrates right side cabinet opening 26. Figure 6 illustrates dispensing unit with cover panel 140 also removed. Figure 7 illustrates food dispenser 10 with the first hopper support assembly 70 also removed. Removal of assembly 50, 70, 72, 90, 92, 120, 122 can be done with relative ease to facilitate, for example, cleaning and repair of food dispenser 10. The separate nature of assemblies 70, 72, 90, 92, 120, 122 make it possible to remove and replace these assemblies on one side of food dispenser 10 without having to remove the assemblies on the opposite side of food dispenser 10, thus further promoting accessibility, cleaning and repair of those assemblies.

A particular advantage of food dispenser 10 is that it includes two hopper assemblies with associated accumulator and hopper support assemblies. Known food-dispensing units typically include a single hopper assembly so that only a single type of food article can be dispensed at a time. As a result, there would typically be a need for separate food dispensing units for each individual type or shape of food; for example, one food dispenser dedicated to vegetable products and a separate food dispenser for all protein products. Because some types of food require more regular cleaning and

sanitation of the food dispenser, require storage at a specific temperature (or within a specific temperature range), or must be dispensed at a certain rate or a certain quantity, known food dispensers are often specialized for a certain type of food. The food dispenser of the present invention has the added versatility of dispensing at least two different food items using a single food-dispensing unit. For example, first hopper assembly 120 may be used for dispensing a protein-based product of a specific size and density while second hopper assembly 122 may be used for dispensing a vegetable product such as french fries. Because hopper assemblies 120, 122 are separate and distinct from each other and are individually programmable and removable from freezer cabinet 12, each hopper assembly may be cleaned, repaired or otherwise maintained and programmed separately from the other hopper assembly.

Referring now to Figure 8, mounting plate assembly 50 may include a mounting plate 52, first and second linear rails 58, 60 with associated rail support blocks 59, 61, first and second mounting brackets 54, 56, first and second solenoids 62, 64, and a fan unit 66. Mounting brackets 54, 56 are configured to support first and second hopper support assemblies 70, 72 and are maintained in a pre-determined vertical position relative to support blocks 59, 61 that are free to move vertically on linear rails 58, 60. Solenoids 62, 64 are used to actuate the accumulator assemblies 90, 92, and fan unit 66 may be used to create air movement within the cabinet. In other example embodiments, mounting plate assembly 50 may have different configurations such as, for example, the first and second linear rails being integrated as a single rail supported by a single support bracket, or multiple linear rails and support brackets may be used to support each of the hopper support assemblies.

Referring now to Figures 9 and 10, hopper support assembly 70 includes load cell brackets 74, 75, a load cell 76 positioned between brackets 74, 75, a hopper support 78, a drum motor shaft 80, a drum motor 82, a drum motor bracket 84 that supports the shaft 80 and motor 82, a drum shaft aperture 86 formed in the hopper support 78, and a drum shaft bushing 88 sized to fit within aperture 86. Hopper support assembly 70 is symmetrical about a vertical centerline (not shown) so that it can be used

on either the right or left side of cabinet 12. In other embodiments, hopper support assembly 70 may be asymmetrical and configured for use on a single side of cabinet 12.

When the entire food dispenser 10 is assembled together, the upper load cell bracket 74 is mounted to hopper support 78, which is supported by one of vertically movable supports 59, 61, while lower load cell bracket 75 is supported in a stationary position on a bottom portion of mounted plate assembly 50 (see the side view of Figure 14). With the load cell secured to both the movable upper load cell bracket 74 and the fixed lower load cell brackets 75, the load cell 76 can measure the change in mass due to changes in the amount of product in the hopper.

Referring now to the front and rear perspective views of Figures 11 and 12, an accumulator assembly 90 includes an accumulator housing 94 that defines an accumulator food article storage location 98, and an accumulator door 96 sized to fit within housing 94. Front and rear ends 100, 102 of housing 94 include front and rear apertures 104, 106 that pivotally engage portions of accumulator door 96. The accumulator may be symmetrical about a vertical plane (not shown) extending between apertures 104, 106 so that the accumulator assembly 90 can be used in either side of the cabinet 12 to receive food articles from either hopper assembly 120, 122.

Door 96 is rotatable within accumulator housing 94 between an open position 108 (see Figure 15) and a closed position 110 (see Figure 15). When door 96 is in the closed position 110, a substantially air tight seal is formed between the door 96 and an interior surface of accumulator housing 94, and a substantially air tight seal is formed between an outside surface of accumulator housing 94 and that portion of freezer cabinet 12 that define cabinet openings 26, 28 in order to prevent outside air from entering into freezer cabinet 12. These substantially airtight seals facilitate maintenance of a predetermined temperature range within the freezer cabinet.

Typically, the accumulator assemblies are removed from cabinet 12 (when food dispenser 10 is being cleaned or repaired), which would allow outside air to enter through openings 26, 28. Furthermore, the only time that accumulator door 96 is moved into the open position 108 (using solenoid 62 or 64) is when the accumulator assembly is dispensing food articles into a basket. After the dispensing of the food

articles is complete, the accumulator door preferably immediately returns to the closed position 110 (using solenoid 62 or 64) to prevent cool air from exiting cabinet 12 and prevent warm air from entering into cabinet 12.

Referring now to Figure 13, the hopper assembly 122 is shown in an exploded perspective view, and includes a hopper 124 that defines a primary food article storage location 126, a rotatable drum 128, a hopper lid 130, and a diverter 132. Hopper assembly 122 may be a mirror image of hopper assembly 120.

As shown in further detail in the cross sectional view of Figure 15, drum 128 is mounted to the drum motor shaft 80 of hopper support assembly 72. Diverter 132 is positioned adjacent to drum 128 to create a specified gap with the drum 128 that allows, when the drum 128 turns, food articles to flow with the drum, but stops the flow of food articles when the drum 128 stops turning. As food articles move past diverter 132, they pass directly into accumulator 92. Unless accumulator door 96 is in the closed position 110, the food articles will move through the accumulator and into a basket positioned below the accumulator 92. Preferably, the accumulator door 96 is maintained in the closed position 110 until a predetermined amount of food articles is moved from hopper 124 via rotation of drum 128 into accumulator housing 94. Food articles are then maintained in the accumulator housing 94 until a basket is positioned in the loading position (which is either automatically or manually determined using, for example, sensor 38), at which time the accumulator door 96 is rotated into the open position 108 and the desired amount of food articles fill the basket.

As discussed above, the amount of food articles passed from hopper 124 into accumulator housing 94 is determined based on change in total weight of food articles within hopper 124. By using a continuous weighing method, rotation of the drum 128 can be controlled with precision so as to pass an accurate amount of food articles into the accumulator housing 94. This type of negative weighing also provides for an accurate assessment of the amount of food articles left within hopper 124. An empty signal may be initiated when the hopper reaches a certain empty level.

Although load cell 76 is the primary weight measuring feature of food dispenser 10, there are other features that together with load cell 76 define a load/weight

sensing/measuring assembly that measures the change of weight of the food articles in food dispenser 10. The load/weight sensing/measuring assembly includes at least the features of mounting plate assembly 50 and hopper support assembly 70. Various sensors (not shown) that are controlled by a controller (not shown, but stored in lower frame structure 14) may be associated with the load/weight sensing/measuring assembly to indicate when targeted weights have been attained. For example, a sensor may be used to send a weighed signal to a controller, and the controller generates a signal at operator control panel 22 when a target weight for food articles dispensed into the accumulator 90, 92 has been reached. Based on the weighed signal and the predetermined parameters, the controller may send a control signal to drum motor 82, 84 for operation of drum motor 82 in specific directions, for a specified period of time, and at a specified rate. Once the desired weight is reached, the controller then determines whether a manual dispensing request (for example, via operator control panel 22) or an automatic dispensing request (for example, via a pre-programmed operation of the controller) is made. If the request is made, the controller sends a control signal to an accumulator solenoid 62, 64 to open the accumulator door 96.

The various features described herein can be made from different materials depending on the purpose of that feature and whether that feature is exposed to food articles. For example, most of the features that are in direct contact with food articles, such as the hopper and accumulator housing, are made from a sterile, easy to clean material such as a polymer-based material. Some polymer-based materials also act as an insulator to help maintain the predetermined temperature range within freezer cabinet 12. For example, accumulator housing 94 may extend out of freezer cabinet 12 in the direction of the baskets supported by lower frame structure 14. Some types of materials with high heat conduction may transfer the heat absorbed from the outside air into the freezer cabinet or to the food articles held by the accumulator housing. In contrast, materials with high insulating properties and low heat conduction help create a temperature barrier between the outside and inside of the freezer cabinet 12 via the accumulator housing.

Other features of the food dispenser 10 may be made of metals and metal alloys such as stainless steel that are corrosion resistant and easy to clean, while some features that are not exposed to food articles, such as the mounting plate assembly and some features of the hopper support assembly, can be made of any suitable material in order to perform their intended function.

Although the illustrated embodiment includes two separate hoppers, other embodiments may include only a single hopper assembly with an associated accumulator assembly and hopper support assembly rather than having two such sets of assemblies. Such a single hopper assembly configuration would still possess the advantages described above related to a negative weighing system and temperature control. In yet further embodiments, the food-dispensing unit may include three or more hoppers positioned within a freezer cabinet that possessing the advantages described above. In yet further examples, the food dispenser examples disclosed herein may be used in conjunction with an automated basket system such as the system disclosed in U.S. Patent No. 6,125,894, or with a system that adjusts for various densities of food articles as disclosed in U.S. Patent No. 6,305,573, which references are incorporated herein by reference in their entirety.

The controller (not shown) of the food dispenser 10 is stored in the lower frame structure 14 and may be used to control several features of the food dispenser either automatically or through the operator control panel 22. The controller may include memory and a microprocessor for preprogramming of the food dispenser for certain types and sizes of food articles. The controller may (for example, using the operator control panel 22) control the temperature within the freezer cabinet, provide signals when the amount of food articles in the hopper reaches a certain level, or automatically dispense food when a basket is brought into a load position. Many other control functionality options may be possible with the controller and the operator control panel 22 within the scope of the present invention.

While a particular embodiment of the invention has been described with respect to its application for dispensing articles, such as frozen french fries, onion rings, and protein products such as chicken tenders, etc., it will be understood by those of skill

in the art that the invention is not limited by such application or embodiment for the particular components disclosed and described herein. It will be appreciated by those skilled in the art that other configurations that embody the principles of this invention and other applications therefore can be configured within the spirit and intent of this invention. The example configurations described herein are provided as only example embodiments that incorporate and practice the principles of this invention. Other modifications and alterations are well within the knowledge of those skilled in the art and are to be included within the broad scope of the appended claims.